013609 - Solana/Encinitas Beaches, CA

Contributed by Susie Ming
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Public Comments:
The public comment period for the draft report closes on Oct. 14, 2005. Send comments to Study Manager:

Susie Ming
Chief, Coastal Studies Group
USACE Los Angeles
PO BOX 532711
Los Angeles, CA 90017

or if you wish to send comments to Ms. Ming via email, please click here...

Project Overview: The Encinitas and Solana Beach Shoreline Feasibility Study will investigate alternatives to arrest the coastal bluff erosion that occurs during severe winter wave climate along the shoreline within the cities of Encinitas and Solana Beach.

Background Information: In the last 10 to 15 years, the Solana Beach-Encinitas shoreline has experienced accelerated erosion of the beaches and coastal bluffs. Since the late 1970s and early 1980s, Southern California has experienced a series of unusual weather patterns when compared to the rest of this century. Fluvial delivery (the movement of material from upstream locations to replenish the beaches) has been significantly reduced due to river damming and inland sand mining activities. The cumulative effects of these impacts have produced erosion of the once-wide, sandy beaches. As a result of the severe winter storms in the 1982-1983 El Nino year and the extreme storm of 1988, most of the thin sand lens on the Encinitas beaches was lost even prior to the 1997-1998 El Nino season. Within Solana Beach, the chronically denuded beach condition was also worsened after the 1997-1998 season. It is apparent that beach sands were stripped away and lost from the littoral system during that season. With the loss of the wide sandy beaches, storm waves attack the toe of the bluff and eventually form a notch.

As the notch depth increases, it eventually triggers an upper bluff failure. The timing of these failures are difficult to predict and often occur several months after the storms have passed. As a result, damages occur to bluff top structures when bluffs collapse.

This has prompted property owners atop the bluffs to armor or otherwise try to protect their property before structural damage occurs. Approximately half of the shoreline in the study area has been modified with some type of bluff protection structure, at significant cost. These seawalls provide piecemeal protection at varying levels. Our study focuses on a more comprehensive solution over the critical study area.

The loss of beach has also severely degraded recreational value in all reaches, and the loss of beach combined with the undercutting bluff erosion creates dangerous overhangs which constitute a serious public safety issue. There have been two fatalities in recent years caused by sudden bluff collapse in the study area and adjacent beaches.

The critical areas were delineated in two segments. Segment 1 (Reaches 3, 4, and 5) exists within the City of Encinitas and extends from the 700 Block of Neptune Avenue to Swami’s Reef and is approximately 3.2 kilometers (km) [2.0 miles (mi)] in length; Segment 2 exists within the City of Solana Beach and stretches from Table Tops Reefs to the southern limit of Solana Beach (Reaches 8 and 9) and is approximately 2.3 km (1.4 mi) in length.

Alternatives Considered: Available methods considered to eliminate or reduce coastal storm damages and shoreline erosion include;

- non–structural measures (best management practices, relocations, etc.)
- seawalls of various designs,
- rock revetments,
- beach nourishment alone,
- beach nourishment with sand retention structures (such as groins and breakwaters), and
- beach nourishment with bluff toe protection (to stabilize lower bluff).

After analyzing and comparing each alternative based on economic and environmental criteria, the Recommended Plan is the Beach Nourishment with Bluff Toe protection plan.

The Recommended Plan consists of two components: notch fill at the bluff base and sand nourishment on the beach.

Notch fill- The construction procedure consists of scraping sand layer away to expose the bedrock layer; and sealing up eroded notches with erodible concrete. The shotcrete gunite with special grout material is typically used for the notch-fill construction as it builds up the concrete seal layer-by-layer and is less impacted by the rising tides. The construction equipment required includes a backhoe for sand scraping and a high-pressured nozzle for concrete fill. In Segment 1, the The notch fill will extend approximately 2.4 km along the toe of the bluff in Segment 1 and approximately 2.2 km in Segment 2 The particular design for a notch fill is based on the geotechnical characteristics of the area and the size of the notch The size and quantity of notch fill will depend on depth and height of notch at each specific location.

Beach fill- In Segment 1, approximately 628,100 cm of beach quality sand would be initially placed along 2.4 km (1.5 mi) of shoreline providing a nourishment width of 60 meters at a berm elevation of approximately +3.9 meters (+12.8 feet) Mean Lower Low Water (MLLW). The berm would be flat and approximately 60 meters wide. The beach fill would then naturally slough seaward approximately 43 meters (134 feet) at a slope of 10:1 (horizontal distance:vertical distance). The beach fill will be tapered into the existing beaches to the north and south of the segment. Beach replenishment of an additional sand volume of 261,500 cm would occur on average every 5 years within the 50-year project lifetime.

In Segment 2, approximately 309,600 cm of beach quality sand would be initially placed along 2.2 km of the shoreline, providing a nourishment width of 30 meters at a berm elevation of approximately +3.9 meters (+12.8 feet) Mean Lower Low Water (MLLW). The berm will be flat and approximately 30 meters wide. The beach fill would then naturally slope seaward approximately 38 meters (119 feet) at a slope of 10:1 (horizontal distance:vertical distance). The beach fill will be tapered into the existing beaches to the north and south of the segment. Beach replenishment of an additional sand volume of 140,300 cm would occur on average every 5 years within the 50-year project lifetime. The table below summarizes the costs and benefits of the Recommended Plan

Photos (Click to enlarge)

Economic Summary Total Costs$30,142,000Annual Costs$1,772,000Annual Benefits$2,582,000Net Annual Benefits$809,000Benefit/Cost Ratio1.46

Documents:
Draft Feasibility Report (8.65MB PDF)
Draft EIS/EIR Executive Summary (607KB PDF)
Encinitas Solana Shoreline Presentation (1.45MB PDF)
Public Notice (217KB PDF)

If you wish to have the complete EIS/EIR, please click here...

Study Participants:

The non-Federal Sponsors for this project are: The City of Encinitas
http://www.ci.encinitas.ca.us/

The City of Solana Beach
http://www.ci.solana-beach.ca.us/

Contacts:
Study Manager:
Susie Ming
Phone: (213) 452-3789
Fax: (213) 452-4204
susan.m.ming@usace.army.mil

Project Manager:
Greg Boghossian
Phone: (213) 452-3982
Fax: (213) 452-4204

gregory.h.boghossian@usace.army.mil

City of Encinitas:
Kathy Weldon, Prgm Director
Phone: (760) 633-2632
Fax: (760) 633-2818
kweldon@ci.encinitas.ca.us

City of Solana Beach:
Steven Apple, Director of Community Develpment
Phone: (858) 720-2440
Fax: (858) 755-1782
sapple@cosb.org

Public Affairs Office:
Greg Fuderer
Phone: (213) 452-3923
Fax: (213) 452-4209
gregory.a.fuderer@usace.army.mil